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## Forest Tent Caterpillar

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The forest tent caterpillar (*Malacosoma disstria* Hbn.) may be found throughout the greater part of the United States and Canada. It is a native insect which has attracted attention since colonial times. Regionwide outbreaks have occurred at about 10-year intervals.

### Hosts

The favored host in the Lake States is quaking aspen (poplar); in the Northeast, both aspen and sugar maple are preferred; in the South, bottom-land gums; and in the Northwest, alder and willow. Other tree species fed upon include birch, cherry, oak, basswood, and elm. Red maple is avoided. At times when trees have been stripped by large numbers of caterpillars, these pests may feed upon brush species and even cultivated fruits and vegetables.

### Injury

Heavy loss of leaves causes a general decline in tree vigor (fig. 1). This is accompanied by a "dieback" of the twigs and branches and a reduction in radial growth. As much as 90 percent of the normal annual growth of aspen may be lost during the third year of complete loss of

leaves. Heavy attacks on maple sugar orchards may injure the trees seriously and reduce the quality as well as the quantity of sap. But tree death does not usually occur, although during the 1933-38 outbreak the loss of leaves for 4 or 5 years killed as much as 80 percent of the aspen in localized areas in Minnesota where growing conditions were poor.

### Life History and Description

There is one generation a year. Young larvae appear when the leaves are just beginning to unfold. The time may vary depending upon prevailing weather conditions and the locality. When first hatched, the larvae are nearly uniform black, less than  $\frac{1}{2}$  inch long, and bear conspicuous hairs. With each successive molt the markings of pale bluish lines along the sides of a brownish body and a row of keyhole-shaped spots on a black back become more evident (fig. 2, A). When full grown they are approximately 2 inches long. No tent is spun; instead a silken mat is formed on the trunk or branch where the larvae congregate when at rest or during molting periods (fig. 2, B). Five to six weeks from the time of hatching,

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Figure 1.—Forest tent caterpillars strip the leaves from the trees, often over extensive areas.

cocoons of whitish silk are spun in a folded leaf or in a bark crevice. The moths, which emerge in about 10 days, are light buff brown and have stout bodies. They have a wing expanse from 1 to 1½ inches; the forewings have two darker oblique lines near the middle. The average length of adult life is about 5 days.

The eggs are laid in masses of 100 to 350, which encircle twigs up to ½ inch in diameter. Each mass is cylindrical with flat ends (fig. 3). The eggs are cemented together and are coated with a frothy gluelike substance, which later turns a glossy dark brown. The embryos develop into first-instar larvae within 3 weeks. These tiny larvae remain in the eggs until the following spring. An average of 19 egg masses per 6-inch tree is usually associated with complete loss of leaves.

### Natural Control

In some years, after the eggs have hatched, freezing weather materially reduces the caterpillar population. When trees have been com-

pletely stripped of leaves, starvation also causes heavy mortality in the late larval stages. Temperatures above 100° F. in the shade during adult emergence or egg laying cause death of moths and low viability of eggs.

Although several species of hymenopterous and dipterous parasites attack the eggs, larvae, and pupae, the most important is a dipteran, *Sarcophaga aldrichi* Park. This large gray fly deposits living maggots on the cocoons into which they bore, killing the prepupae or pupae, as well as any other parasites that may be present. During the last years of a forest tent caterpillar outbreak, these flies become enormously abundant and annoying but contribute greatly to the abrupt termination of the infestation.

Predatory beetles, ants, and birds feed on the caterpillars, but it is not known to what extent they affect populations.

A wilt disease caused by a virus often destroys large numbers of caterpillars.





Figure 2.—Forest tent caterpillar: A, A row of keyhole-shaped spots on the back is evident in the late larval stages. (Courtesy of Quetico-Superior Wilderness Research Center.) B, Larvae congregate when at rest or during molting periods.



Figure 3.—Each egg mass of the forest tent caterpillar is cylindrical with flat ends and encircles a twig which may be up to  $\frac{1}{2}$  inch in diameter.

## Direct Control

Loss of leaves from small shade and ornamental trees can be prevented by the collection and destruction of the egg masses during the winter months when they can be easily seen on the twigs. The most effective control can be obtained by spraying the foliage with DDT at the time the caterpillars are about  $\frac{1}{2}$  inch long—a week or so after the leaves have begun to unfold. Large trees or resort areas can be sprayed with ground equipment, such as hydraulic sprayers; a 50-percent wettable DDT powder should be used at the rate of 2 pounds in 100 gallons of water. Small areas, accessible by roads, can be successfully treated with a mist blower, using a 25-percent DDT emulsion concentrate at the rate of 1 quart in 3 quarts of water.



For small trees, a foliage spray of 6 level tablespoonfuls of 25-percent DDT emulsion concentrate or 10 level tablespoonfuls of 50-percent wettable powder in 5 gallons of water, applied with a knapsack sprayer, has proved satisfactory. Clusters of caterpillars on the trunks or lower limbs of trees can be killed by thoroughly drenching them with the previously mentioned mixture of 50-percent DDT wettable powder and water. Sprays are much more effective than dusts. Kerosene or fuel oil solutions of DDT should not be used in ground equipment, as the heavy dosage may burn the foliage or injure the cambium.

Under forest conditions, or in resort areas and campsites where a relatively large acreage may need treatment, application of the spray by aircraft is the most rapid, effective, and economical method. An emulsion or an oil solution containing 12½ percent of DDT and applied at the rate of 1 gallon per acre will give control. Under experimental conditions good control has been obtained by using 11½ pounds of toxaphene or 0.15 pound of dieldrin or endrin in 1 to 1½ gallons of fuel oil per acre.

Careless application of insecticides may cause injury to fish;

minnow tanks should be covered during an aerial spraying operation, and spraying should not be done when breezes threaten to drift the insecticide over open water.

When a resort area is sprayed, an additional strip about 400 feet wide adjacent to the area should also be treated. This barrier strip will serve to absorb migrating caterpillars.

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